

# The Eye

by K. E. Anderson

Your eyes are your body's movie camera. They collect light and record the patterns it makes. The nerves at the back of your eyes code the patterns and send signals to your brain. Your brain analyses the signals and builds them up into a detailed visual image of the world.

Eye-moving muscles

Iris

Pupil

Cornea

Clear liquid

Lens

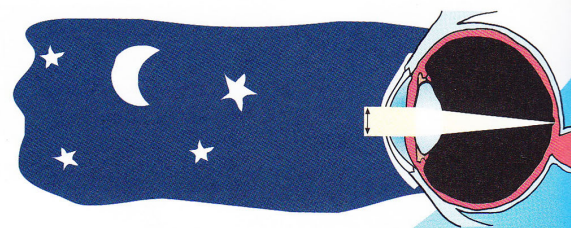
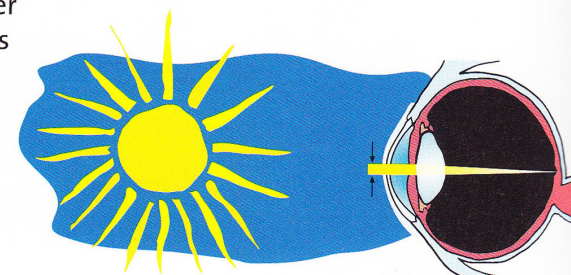
Retina

Fovea

Optic nerve

On its way to the back of the eye, incoming light passes through the cornea, which is the clear outer layer of the front of the eye. The light then passes through a liquid-filled chamber and hits the iris and the pupil. The iris is a coloured disc, and the pupil is the black area at its centre. (The commonest colours of people's irises are brown, blue, and green – these colours are genetically controlled.)

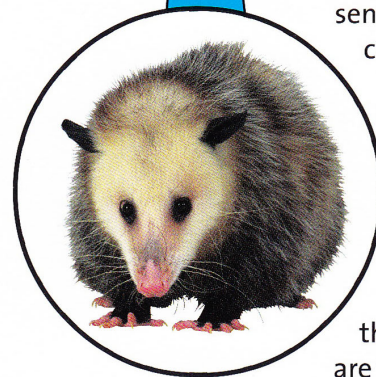
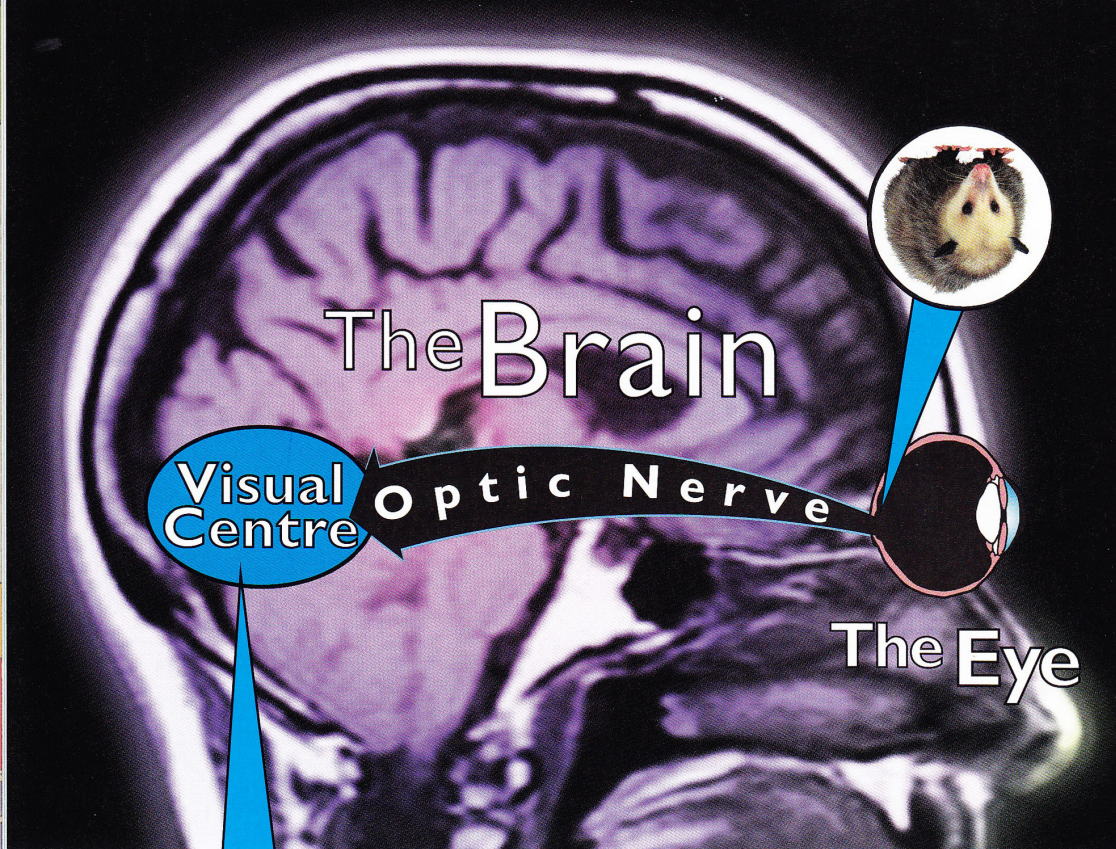
The pupil is actually a hole. The iris controls the size of the pupil. In this way, the iris determines how much light gets into the eye. In bright light, the iris closes a little, and so the pupil becomes smaller. This protects the retina at the back of the eye. In dim light, the iris opens to let in more light, and so the pupil becomes larger.



Just behind the iris is a lens, which changes the direction of incoming light and focuses it onto the retina at the back of the eye. The lens is surrounded by a ring of muscles that pull on it and change its shape. The exact shape of the lens depends on whether you need to focus on something that's close up or far away. When people have problems with their eyesight and need glasses, it is often the lens that is causing the problem. (The cornea is also curved and helps to create a sharp image.)

Between the lens, which is near the front of the eye, and the retina, which is at the back of the eye, is a jelly-like fluid that gives the eye its shape. The fluid is "optically true". This means that it transmits light without bending or scattering it. The retina is like the eye's "film-strip". It records focused images of the outside world by using millions of light-sensitive cells called rods and cones. The rods are tuned to analyse how bright the light is, and the cones record what colours it is. If you look at a black and white photograph, you will get an idea of what information the rods are recording: just light and shade but no colours.

There are three types of cone cells for recording colour. Each type reacts to just one of the primary colours: red, blue, or yellow. All the varied colours we see are combinations of these three colours. For example, green is a mixture of blue light and yellow light. When the eye sees green light, it is the yellow and the blue cones that are "sparking" and sending electrical nerve impulses to the brain. The colour-sensitive cone cells are concentrated in one small depression at the centre of the retina. This area is called the fovea. It is only a couple of millimetres in diameter. The rest of the light-sensitive cells on other parts of the retina are almost all rods.



The millions of rods and cones send electrical impulses along the optic nerve to the brain. The brain processes all the information it is receiving, makes sense of the millions of incoming messages, and creates a meaningful image of what we are seeing. For example, the image on the retina is actually upside down, and turning it right side up is just one of the mental adjustments that the brain makes. In making meaning from many different patterns of light, the brain often makes assumptions based on what it is expecting to see. It adjusts our mental image of the world accordingly. Most of the time, our brains are very accurate in these assumptions. But sometimes mental adjustments result in what we call "optical illusions". The following article describes one such illusion.